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by the difference of the constants. This, divided by 365, gives $-0''.98$ as the correction to be applied to the constant of the American *Nautical Almanac*, in order to make it agree with my own. Hence, this latter value being $3422''.32$, it follows that the constant employed in the above work is $3423''.30$.

Report of the Astronomer Royal to the Board of Visitors. Read at the Annual Visitation of the Royal Observatory, Greenwich, 1853, *June* 4.

In this Report the Astronomer Royal exhibits the state of the Observatory on 1853, May 22, and records generally the principal occurrences from 1852, May 18, to 1853, May 22.

Under the head of *Grounds and Buildings*, an account is given of the progress of operations for forming a galvanic communication between the Observatory and other places of importance, both in this country and on the Continent. The communication with the various parts of the British Isles is maintained by means of wires passing from the Observatory to the South Eastern Railway Terminus at London Bridge. With respect to the Continent, this is effected by forming a connexion between the Observatory and the wires of the Submarine Telegraph Company, which pass underground from London to Dover. One of the Company's wires was cut where it crosses Blackheath, and the interrupted segments were continued by branches to a turn-plate, which is contained in an iron box fixed in the south wall of the Park. From this turn-plate a wire is led into the transit circle-room of the Royal Observatory. By different adjustments of the turn-plate, communications are made between London and Paris, between London and Greenwich, or between Greenwich and Paris. This part of the Report concludes with the statement that the Observatory now possesses the means of communicating with every part of Great Britain and of the Continent.

The Moveable Property, the Manuscripts, and the Library of the Observatory, are next noticed in succession. With respect to the Manuscripts, it is stated that Professor De Morgan has recently transmitted to the Observatory a considerable number of letters found in the collection of correspondence of the late Mr. Baily. These letters are, doubtless, calculated to throw much valuable light upon the scientific history of the age in which Mr. Baily lived; and on this account they cannot fail to be hereafter consulted with advantage.

Astronomical Instruments.—The condition of the various instruments is noticed under this head, and appears to be satisfactory. With respect to the recording of transits by the aid of galvanism, the following statement is made:—"The Barrel Apparatus for the American method of observing transits is not yet brought into use. In an apparatus, embodying much that is new (for the

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circumstances under which we have to try it differ much from those of the original experiments) there must be a great many small alterations; and sometimes from the demand for workmen competent to perform work of this kind, a single alteration has caused more than a month's delay. I have, however, brought it to such a state that I am beginning to try whether the barrel moves with sufficient uniformity to be itself used as the transit clock. This, if perfectly secured, would be a very great convenience; but I am not very sanguine on that point. Much convenience will, however, be gained by making the barrel to move with a speed approaching very near to uniformity, even though the barrel-clock be not quite accurate enough to be used as the best measurer of time in the Observatory, and, therefore, not accurate enough to be used for impressing the second-dots upon the barrel."

Observations.—No alteration has been made in the general system of meridian observations. The observation of the moon on the meridian is never omitted; that of the sun and planets only on Sundays. The whole number of observations from 1852, May 18, to 1853, May 22, is nearly as follows:—In the transit department: transits, 4037; observations of collimators, 312; observations of transit wire by reflexion, 312; observations of one collimator by the other, 52. In the meridian circle department: observations of all kinds, 4475.

The Reflex Zenith Tube has been in active use during the past year. Between May 18 and October 20, 106 single observations have been obtained with it.

The Altazimuth has been used in precisely the same manner as in the preceding years. The number of days of complete observations of the moon is 224, or 18 per lunation, against 106 with the transit-circle, or $8\frac{1}{2}$ per lunation. Of the altazimuth observations, 0 are when the moon passed between 0^h and 1^h, 4 between 1^h and 2^h, 8 between 2^h and 3^h, 8 between 3^h and 4^h, 6 between 20^h and 21^h, 0 between 21^h and 22^h, 1 between 22^h and 23^h, 1 between 23^h and 24^h. In none of these positions, except on a single occasion between 20^h and 21^h, was the moon observed on the meridian. The whole number of separate observations of moon and stars with the Altazimuth is 1003; and the whole number of separate observations of its collimator, 712.

The South Equatoreal has been used only for images of the solar spots. The Double-Image Micrometer has been employed in executing measures of *Venus*, *Saturn* and his Rings, and *γ Virginis*.

The Reduction and Printing of the astronomical observations are next noticed in the Report. The advanced state of the Reductions (although not so close as usual, in consequence of a serious diminution of the strength of the establishment arising from the illness of several of the assistants) is attributed chiefly to the order and energy of Mr. Main. Allusion is then made to the operations connected with the Magnetical and Meteorological departments of the Observatory.

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Chronometers, Communications of Time, and Operations for Longitude.— Under this head various interesting facts are detailed. "The number of chronometers now on hand," it is stated, "is 120. The system of rating the chronometers daily or weekly, as the case appears to require, of reporting the rates to the Admiralty, of rating the trial-chronometers in extremes of heat and cold, of abstracting their rates, of superintending repairs, and of dropping the signal-ball, remains unaltered. In the mechanical part of the operation of rating, an alteration has been made which contributes greatly to convenience, and in some measure to accuracy. At the time of the Visitors' last meeting, a normal clock had been erected by Mr. Shepherd, furnished with a small apparatus suggested by myself (an auxiliary pendulum, which can be made very long or very short, and can in either state be connected with the clock-pendulum), by means of which the indication of the clock can be increased or diminished by any required quantity above $0^s{\cdot}01$. The error of this clock being ascertained every day, by means of another clock close to its side, which has been compared with the transit-clock, there is no difficulty (with the use of the auxiliary apparatus above-mentioned) in making it sensibly correct. This clock keeps in motion a sympathetic galvanic clock in the chronometer-room, which, therefore, is sensibly correct; and thus the chronometers are compared with a clock which requires no numerical correction. I need not insist on the facility, and the freedom from a fruitful source of errors, which are thus obtained.

"The same normal clock maintains in sympathetic movement the large clock at the entrance-gate, two other clocks in the Observatory, and a clock at the London Bridge Terminus of the South-Eastern Railway (first tried with the assistance of C. V. Walker, Esq., as an experiment, but now to be used for automatically making and unmaking certain connexions of our galvanic wires). It sends galvanic signals every day along all the principal railways diverging from London. It drops the Greenwich ball, and the ball on the offices of the Electric Telegraph Company in the Strand; and the correctness of the last of these operations is tested by means of a galvanic signal-needle upon the case of our transit-clock. All these various effects are produced without sensible error of time; and I cannot but feel a satisfaction in thinking that the Royal Observatory is thus quietly contributing to the punctuality of business through a large portion of this busy country.

"I have the satisfaction of stating to the Visitors that the Lords Commissioners of the Admiralty have decided on the erection of a time-signal-ball at Deal, for the use of the shipping in the Downs, to be dropped every day by a galvanic current from the Royal Observatory. The construction of the apparatus is intrusted to me. Perhaps there is no roadstead in the world in which the knowledge of true time is so important."

The operations for the determination of longitudes by means of electric signals are then referred to. The details with respect to

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Cambridge and Edinburgh have been already mentioned in the lecture of the Astronomer Royal at the last meeting of the Society.* With respect to the Oxford Observatory, Mr. Airy stated that the wires for connecting the Observatory with the Railway Station at Oxford are nearly completed, so that the determination of the longitude of the Observatory by galvanic signals may be expected at no distant date.

The galvanic determination of the longitude of the Royal Observatory of Paris and of other Continental observatories relative to Greenwich, will constitute the natural sequel to these operations.

After a brief allusion to the personal establishment of the Observatory, the author of the Report proceeds to notice the "*Extraneous Computations.*" Under this head it is stated that the revision of the Star Results of Dr. Maskelyne is now completed, and a hope is justly expressed that " it will be found that the publication of these deductions will give most valuable information on the state of the sidereal heavens from 1765 to 1807."

A proposal is next made respecting the Observations of the Moon. The great work on the Lunar Reductions terminates with the year 1830. The theory employed in computing the tabular places of the moon, with which the results of observation were compared, was mainly that of Plana. In recent years (from the beginning of 1836) the places of the moon deduced from the observations have been compared with the corresponding places in the *Nautical Almanac*, calculated from Burckhardt's Tables; but, as the latter have been found by Mr. Adams to be sensibly erroneous, in so far as regards the parallax, the Astronomer Royal suggests whether it would not be desirable at once to complete the reduction of the observations and their comparison with tables, from 1831 to 1851; using, as far as possible, in all respects the same bases of reduction of observations and the same elements of tables as in the former Lunar Reductions.

The Report concludes with some general remarks relative to the present satisfactory condition of the Observatory.

Astronomische Beobachtungen auf der Sternwarte zu Bonn augestellt und herausgegeben von Dr. F. W. A. Argelander. Zweiter Bund, Zonenbeobachtungen am Südhimmel. Zweiter Abtheilung. 4to. pp. 427. Bonn, 1852.

This volume forms the second part of M. Argelander's zone observations included between 15° and 31° of south declination. An account of the observations contained in the first part, including a statement of the general plan of the work, is given at page 26 of the present volume of the *Monthly Notices.* The zones in the part which has recently been published, as mentioned above, extend from No. 322 to No. 404.

* See p. 248.